



## Subject card

Subject name and code	Electronic circuits, PG_00051073						
Field of study	Technical Physics						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group		Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Division of Electrochemistry and Surface Physical Chemistry -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Ryszard Barczyński				
	Teachers		dr hab. inż. Ryszard Barczyński				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	15.0	0.0	60
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		5.0		60.0	125
Subject objectives	The aim of the course is to familiarize students with basic electronic circuits.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W07		The student uses it effectively basic instruments and equipment laboratory.		[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects		
	K6_W06		The student analyzes and designs basic electronic circuits.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	K6_W12		The student safely organizes his work in the laboratory.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	K6_U04		Student builds basic laboratory systems and analyzes them action.		[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	K6_U05		The student uses it effectively basic instruments and equipment laboratory.		[SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		

Subject contents	* Amplifier as a quad, feedback, amplifier stability. * Fulfillment of degrees amplifiers on an operational amplifier, sum amplifier, integrator, derivative circuit, current-voltage converter. * Selective amplifiers, active RC filters. * Non-linear analog blocks functional. * Broadband and power amplifiers. * RC, LC and quartz generators. * Layouts impulse, flip-flop. * Power supply systems, linear and impulse voltage stabilizers * Digital blocks functional, synthesis of combinational and sequential logic circuits.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	51.0%	25.0%
	Lectures	51.0%	25.0%
	Tutorial	51.0%	25.0%
	Laboratory	51.0%	25.0%
Recommended reading	Basic literature	* WWW site * Michał Polowczyk, Elektronika dla fizyków, PWN Warszawa * P. Horowitz, W. Hill, Sztuka elektroniki, WKŁ 2003 * U. Tietze, Ch. Schenk, Układy półprzewodnikowe	
	Supplementary literature	* Ben G. Streetman, Przyrządy półprzewodnikowe * Ch.L. Alley, K.W. Atwood, Elementy i układy półprzewodnikowe * Behzad Razavi, Fundamentals of microelectronics, Wiley 2008. * Mirosław Rusek, Jerzy Pasierbiński, Elementy i układy elektroniczne w pytaniach i odpowiedziach, NT Warszawa 2006.	
	eResources addresses	Adresy na platformie eNauczanie: Układy elektroniczne - Moodle ID: 39723 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=39723">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=39723</a>	
Example issues/ example questions/ tasks being completed	Which goal cannot be achieved by using negative feedback in an amplifier circuit? A) Reducing the sensitivity of the amplifier to the spread of element parameters. B) Reduction non-linear distortions. C) Increase the gain. D) Widening the bandwidth amplifier. To obtain a 1V signal at the output of a certain differential amplifier, you can apply it between... its inputs have a 1mV signal. When we change the supply voltage by 1V, the output voltage will change by 10mV. The amplification factor of this amplifier is therefore... A) 120dB. B) 40dB. C) 60dB. D) 90dB.		
Work placement	Not applicable		

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